

To: Saint, Chris[Saint.Chris@epa.gov]
From: Ross, Mary
Sent: Wed 8/19/2015 2:49:26 PM
Subject: FW: NCEA screening values evaluation re Gold King Mine site -UPDATED 12:32 on August 14 2015
Copy of Gold King Mine draft calcs 8-14-15-rev4 with bioavail data.xlsx
References for Arsenic and Lead Dermal Exposure.docx

From: Vandenberg, John
Sent: Friday, August 14, 2015 12:34 PM
To: Burke, Thomas; Kavlock, Robert
Cc: Phillips, Linda; Flowers, Lynn; Moya, Jacqueline; Ross, Mary; Bussard, David; Gentry, Nathan
Subject: RE: NCEA screening values evaluation re Gold King Mine site -UPDATED 12:32 on August 14 2015
Importance: High

Tom,

we've now evaluated the "site-specific adjustments for bioavailability" data and this note has been revised to incorporate this additional analyses (point 2, below). With these data, the Arsenic numbers work out to be similar for R8 and NCEA. We think R8 has an error in their Pb analysis (which makes the screening number about 8-fold too low), and in their derivation of sol/sediment screening levels (perhaps a typographic error – the same numbers are shown for both soil and drinking water). I've send R8 a note about these points and a copy of the attached spreadsheet. Also, Point 5 below re dermal exposures has been revised. We see an appointment to speak with you about this at 1 today.

John

From: Vandenberg, John
Sent: Friday, August 14, 2015 11:09 AM
To: Burke, Thomas; Kavlock, Robert
Cc: Phillips, Linda; Flowers, Lynn; Moya, Jacqueline; Ross, Mary
Subject: NCEA screening values evaluation re Gold King Mine site
Importance: High

Tom,

We've evaluated the R8 work and have performed some other analyses, here is some "bottom line" information to share:

1) NCEA developed separate child and adult screening level values whereas R8 created a combined (child adult) screening level value for oral exposures. With a few exceptions, the NCEA child and adult values bracket the R8 values with the child values lower and adult higher (the NCEA separate child or adult values are typically within a factor of 2 of the R8 values).

Bottom line: the R8 derivation of soil/sediment and surface water oral exposure screening values for hikers/campers is reasonable though it does not provide as much protection for children as the separate child/adult screening level analysis NCEA developed.

2) NCEA utilized the 'site-specific adjustments for bioavailability' that R8 used for As and Pb; the R8 screening level values for As are consistent with our other findings – i.e., our child and adult values are close to, and bracket, the R8 values. For Pb, and also for vanadium and zinc, we have identified potential errors in the R8 calculations and have informed R8 of our findings (and, we are sharing our analysis with them now). The current R8 screening values for both sediment and water ingestion of Pb are lower (more protective by factor of 2-8) than NCEA values. For Va and Zn, the same values are seen for soil/sediment and water; this appears to be an error in the soil/sediment values. Note also that the 'site-specific' data is actually from mines in Montana.

3) Dermal exposure contributes relatively little to the screening value for combined ingestion and dermal contact with water, for most chemicals. When screening levels are estimated based on a combination of ingestion and dermal exposure using Region 8's ingestion values and ORD/NCEA's dermal values, the screening levels are only slightly lower for most chemicals. A few exceptions are: beryllium, cadmium, and chromium.

4) An initial evaluation of absorption data indicates that due to low dermal absorption rates, dermal exposure may be of less or much less concern than ingestion of contaminated sediment or water; however, this is based on CDC, NJDEP and other agency analyses of absorption data for just 2 chemicals (As and Pb)(reference attached)

- 5) Ingestion of sediment contributes relatively little to the screening value for combined ingestion of sediment and water, for most chemicals. When screening levels are estimated based on a combination of ingestion and dermal exposure using Region 8's ingestion values and ORD/NCEA's dermal values, the screening levels are only slightly lower for most chemicals. A few exceptions are: beryllium, cadmium, and chromium.
- 6) An initial evaluation of absorption data indicates that due to low dermal absorption rates, dermal exposure is of less or much less concern than ingestion of contaminated sediment or water.
- 7) NCEA derived screening level values for more chemicals than R8 did: we also have derived values for antimony, molybdenum, selenium from sediment and surface water ingestion
- 8) We have not compared the screening level values to the levels measured in the water and sediment and do not have any conclusions regarding exceedances of screening levels.
- 9) We are now sharing our evaluation with R8 but have not discussed this with them.
- 10) Potential synergistic or antagonistic risks from exposure to the polymetal mixture have not been evaluated. Risks to potential at-risk populations such as pregnant women have not been specifically considered. Other exposures (e.g., to contaminated fish) have not been considered. Reasonable parameters have been incorporated into the analysis; these may be modified if desired (e.g., child consumption of sediment, duration of exposure) to consider alternative assumptions in derivation of screening levels values or to estimate risks from current or estimated levels of exposure. The NCEA analyses have only been internally reviewed within NCEA.
- 11) We welcome an opportunity to walk you through our analysis (spreadsheet attached) and address any questions you may have.

John Vandenberg

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